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WM. HARROLD SMITH'S

Hermetic Patent Methods

OF

Preserving Wooden Piles,

POSTS, &c., FROM DECAY,

AND

WOODEN PILES, &c.

FROM THE

DESTRUCTION OF THE

Teredo, or Ship Worm.

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WM. HARROLD SMITH'S
PATENT HERMETIC
Process of Preserving Wood
IN CONTACT WITH EARTH.

The Patentee of this invention presents it to the public, confident that it will be found to accomplish the object of preserving wood in contact with earth in the cheapest and most effective manner possible. By its use, timber in situations where it will not last more than from five to seven years, will be preserved for twenty-five or thirty, and the material used for its protection being indestructible, except by actual violence, will last for generations. This invention is specially applicable to the preservation of railroad trestle, telegraph, gate and fence posts, and wooden supports of houses, or to any form of timber set in the ground.

DESCRIPTION OF PROCESS.

The post of wood is surrounded with a casing of vitrified earthen or stone ware, similar to the drain pipe now so extensively used, which extends from a few inches above ground to the depth of two or more feet below; a space of half an inch to an inch is left between the casing and the wood, which is filled in with a preparation of mineral and vegetable tar and clean gravel, or any suitable filling, to within two or three inches of the top of the casing, which is closed with hydraulic or other suitable cement, thus heremetically sealing the wood in the case, and completely excluding the air and moisture, which produce decay.

THE IMPORTANCE OF THE INVENTION.

It is impossible to over-estimate the importance of a cheap and effective mode of preserving timber. Many costly and ingenious expedients have been tried, but without success, except to a modified extent. Covering wood with a plastic and preservative substance, as paint, will preserve it, but is not applicable to that which is to be placed in contact with earth or water. The principal expedients for preservation in such situations looked to impregnating the pores of the wood with some preservative substances, but always failed, because the preservative had to be forced into the pores in a highly fluid or gaseous state under enormous pressure, and as soon as the wood was freed from pressure and placed in contact with the air or water, began to exhale and was soon dissipated from the pores of the wood, which, being injured by the process, decayed with more rapidity than it would otherwise do, and so, though the wood seemed for a time to be benefited, eventually decayed in about the same time as though it had not been so treated. The inventor's plan leaves the wood in its integrity, and by excluding the causes of decay, preserves it. The great agent of decay is the air, and it is by excluding this in hermetically sealed cases that the most perishable substances, such as meats and fruits, are preserved for an indefinite time, and it is by excluding the air and moisture from timber that the inventor's process

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preserves it. The air alone without moisture will not cause rapid decay, as we know from the preservation for hundreds of years of timber excluded from it, as in Egypt; and water alone will not cause it, as wood buried deep in the Irish bogs for thousands of years is found entirely sound; but the combination of air and moisture, at the surface of the earth, causes it to decay more rapidly than in any other situation, and decay once commenced propagates with increasing rapidity, as may be seen by examining any post fixed for a short time in the ground.

MATERIAL USED—MODE OF USING.

The material used is cheap, indestructible, and may be had in almost any market. The demand for stone-ware pipe is daily increasing, and the manufactories are increasing in number and extent to meet the demand, and it is becoming cheaper as competition and skill increase. Coal and mineral tar and cement are among the cheapest and most common productions of the country, and may be had anywhere. The cost of pipe will soon be not more than a wooden casing made of plank.

The application requires no particular skill, and any competent fence maker can readily make it. The pipe may be had round, half round, or square, of any size to suit the posts, and may be put on before, or after they are fixed in the ground. The tar is put in warm and fluid, and fills up every crevice, making an air and moisture-tight covering, which, of itself, would preserve the timber; and the cement is put on top to the depth of two or three inches, and the casing forms a substantial base to the posts. The writer has now before him a piece of inch white pine board covered with the preparation of tar, which has been for seven years below and in contact with

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the ground, and is as fresh as when put down, and would doubtless last in that situation for fifty years, the air and moisture being excluded by an upper covering.

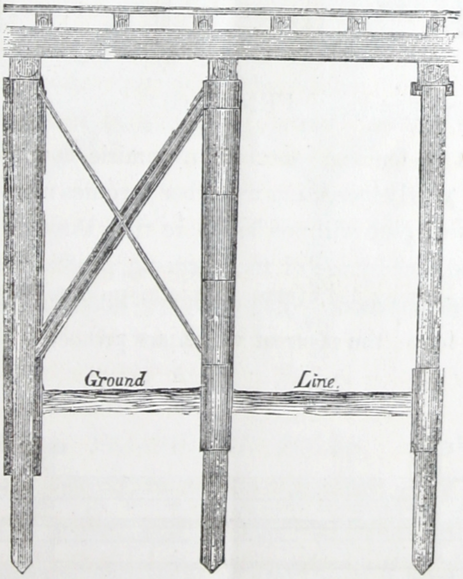
SAVING IN COST OF TIMBER.

By the use of this invention, timber of smaller size and cheaper cost may be used for posts. Sawed pine or other soft wood will last almost as long, if protected, as if it were cedar or locust, and in Illinois and other prairie lands, where timber is very scarce and costly, and daily becoming more so, and in the South where hard woods are scarce and any timber decays with great rapidity, the cost of the application of this invention may be at once saved by the use of smaller posts of inferior wood, which will last for a generation if properly protected by it.

RAILROAD TRESTLE WORK.

This invention is of great value in work of this kind, which, always expensive and of great importance, is specially so in many parts of the country, where from the high cost and scarcity of timber, or its rapid decay, or from the scarcity of proper earth for filling the trestling, is found one of the heaviest items in construction and repair. By using it, timber of smaller size and inferior quality may be used and the ground sill dispensed with, and the posts protected firmly set in the ground, thus saving the costly ground sill, and making the work little if any more costly with the casing than it would be without it, and of greater strength and stability. It is also of great importance for the protection of the joints at the head of the posts, which may be made perfectly air and water tight and would last as long as any part of the work, thus making the principal sources of weakness in trestles strong, and saving enormous expenditure, and making roads on which much trestle work is used greatly safer than as now constructed. Millions of dollars and many valuable lives are annually lost by the decay and deterioration of trestles. The following wood cuts (Nos. 1 and 2) show trestle work protected by the invention:

No. 1.



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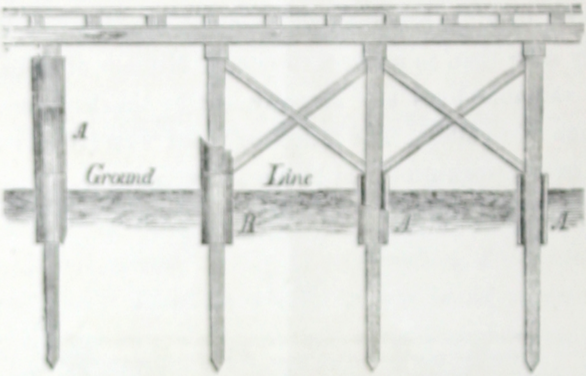
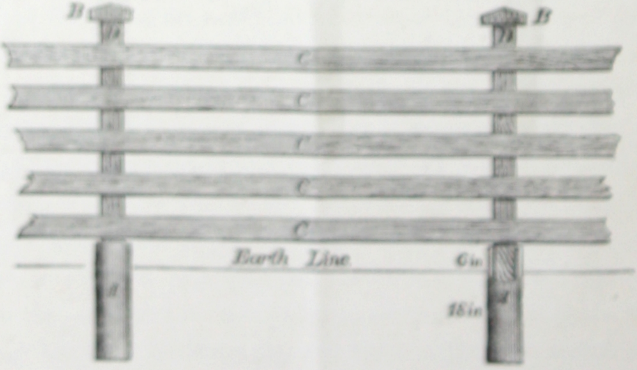


FENCING.

The cost of fencing, especially in prairie countries, is enormous, and yearly increasing as timber becomes more scarce. A post of sawed pine will not last more than three or six years if unprotected, but by use of the hermetic process may be made to last twenty or more. The following wood cut (No. 3) shows a panel of fence, the posts of which are protected by it:

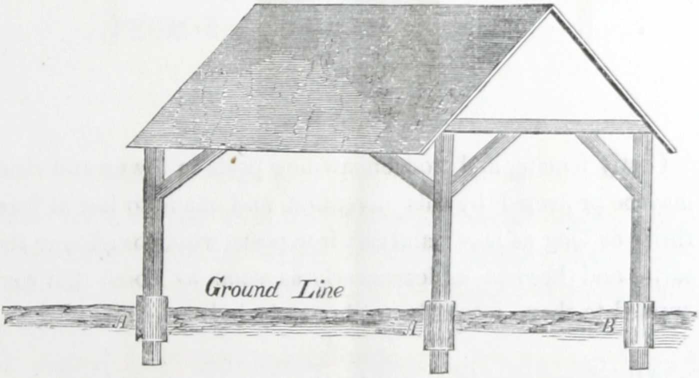
No. 3.



SUPPORTS FOR HOUSES.

In the South, especially, most houses are built above ground upon supports, principally of wood, which decay with great rapidity, and which it is difficult to renew. This invention will preserve them for a generation. Wood cut No. 4 shows a shed, the posts of which are protected.

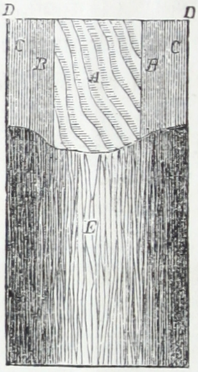
No. 4.



TELEGRAPH POLES.

The cost of the poles on telegraph lines is about $100 per mile, and they will not last more than eight or ten years, if so much ; and as there are in this country from fifty to sixty thousand miles, the outlay in poles is at least $6,000,000, and the depreciation at least $600,000 annually. If protected by this invention, they will last at least double to three times as long. As it is contemplated to follow the example of Great Britain and put the telegraph lines in this country under Government control, as in case of carrying letters, it becomes of great importance to make the lines durable.

No. 5.



Costly fencing and wooden awning posts in towns and cities may be protected by this invention, and made to last at least thrice as long as now; and cast iron posts, which oxidize in the earth and become useless nearly as soon as wood, if it were applied to them, would be made nearly indestructible.

All information in regard to the sale of patent rights; royalty for the use of the same; estimates for doing the work in applying the protection; cost of large or small quantities of pipe; cost of coal tar, cement, etc., will be promptly furnished. In regard to the cost of applying the protection to railroad trestling at the foot and top of the pile, it would range from fifty cents (50 cts.) to one dollar and a half ($1.50) per lineal foot of the structure or pile bridge, less the patent fee, which will be small.

Any communication in relation to this improvement, addressed No. 35 North Charles street, Baltimore, Maryland, will reach the Patentee.

WM. HARROLD SMITH'S
PATENT METHOD OF
Protecting Wooden Piles
FROM TEREDO OR SHIP-WORM.

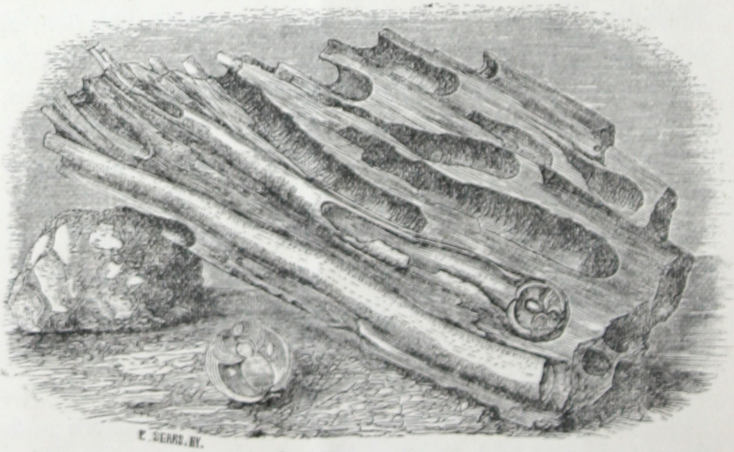
DESCRIPTION OF TEREDO.

The worm shaped shell-fish commonly called Ship-worm, the scientific name of which is *Teredo Navalis*, has been celebrated in all ages for its rapid destruction of timber in salt water. It is mentioned by both Greek and Latin poets and philosophers, and history informs us that the early Portuguese navigators were accustomed to set fire to the bottoms of their vessels so as to char them an inch thick in order to guard them from its ravages, and often thus destroyed the ships. In 1730, '32 and '33, the dykes of Holland, so essential to the safety of that country, were almost destroyed by Teredo, and the danger was so great, and the alarm so wide spread, that eight or ten separate treatises were written upon the subject. Sellius, one of the most learned and distinguished men of his day, and a native of Holland, spent much time and labor in investigating the habits and structure of the animal and the means of preserving the dykes, and gave to his country and the world the result in a monagraph of three hundred and sixty pages, which is to this time regarded as the principal authority on the subject. This book, in spite of many puerile conceits, is a marvel of learning and research, and the animal seems to possess for the writer a wonderful fascination.

During the one hundred and thirty years which have elapsed since Sellius wrote of it, the Teredo has pursued its destruction of the most expensive and useful works of men almost unchecked, and has been justly regarded, as he says of it, "as the greatest scourge which angry Nature has inflicted on man." Though many learned and practical men have studied its structure and habits, and have tried and suggested many plans to prevent its ravages, the whole matter is still obscure; the animal but little understood, and all plans to protect timber from it have failed. Says the latest writer on English conchology, "I have read all the books and treatises on the subject, and have investigated all the specimens I could find, both dead and alive, and yet I feel that I know but little of this wonderful creature." In 1858 the Teredo again attacked the dykes of Holland with unwonted violence, and committed great destruction. A commission was appointed to devise some remedy, but so far as the writer can ascertain, none has been discovered which is practical and effective. Many, or indeed most of the expedients tried were based upon the idea that the Teredo might be destroyed by impregnating the timber with some noxious or poisonous substance, but a better acquaintance with it would have shown that it could not be affected by any such process, as the animal does not consume the wood, but merely bores it. The Teredo is found only in pure sea water, and matures only in timber. It is wonderfully prolific, nearly two millions of eggs having been found in one individual, as Sellius says. The young are exceedingly minute, and the hole by which they enter the wood is not generally to be seen by the naked eye, but once fixed in the timber, it commences to bore its habitation with a beautifully contrived instrument which is effective on the hardest wood, and continues to bore and to grow so long as it meets with no obstacle which it cannot turn, or until it can go no further without entering the hole of another of its kind, and sometimes reaches the length of more than a foot. Sellius was particularly struck with the remarkable manner in which the Teredo avoids cutting into its neighbor's habitation, and holds it up to his readers as a bright example of justice and regard for the rights of others, as it prefers to die rather than encroach upon them, but this habit of segregation and the number of individuals which enter a single piece of timber soon ensures its destruction, as it is bored in every direction. A sound piece of large timber in water much infested by Teredo is often destroyed in a few months, and rarely lasts more than four or five years. As already stated, the Teredo does not consume the wood, but merely bores it away to construct its habitation ; it lives upon infusoria found in sea water, with which it keeps up its communication ; its shell opens at both ends, forming a hydraulic machine for moving the water ; and it is about as reasonable to suppose that a carpenter boring a piece of timber with an augur could be poisoned by impregnating the wood with a poisonous substance, as to suppose that the Teredo could be. If taken out of its timber home and put into pure sea water, it soon dies.

DESTRUCTION BY TEREDO.

In the United States and along the whole Eastern and Western coast of both North and South America as well as in Europe, the destruction of wharves, bridges, and vessels not sheathed with copper in the most perfect manner, is rapidly and constantly going on, and the loss of property from this source is enormous. These structures, among the most expensive which are erected, rapidly crumble away before this formidable shell-fish, and the only means of protection which heretofore has been used for wooden piles with any effect, has been to drive into and cover the surface with large headed iron nails or to sheath them with copper. These plans are imperfect as well as very expensive, and were only used because no better or less expensive ones had been discovered. It is impossible in either way to cover a pile so completely as to prevent so small an animal as the young Teredo borne along with and in a current of sea water, from entering a pile, and once in, the destruction of it is a question of time; a few will destroy in several years what many would do in a few months. The following wood cut shows the Teredo in the wood it has bored, with its instrument of destruction below.

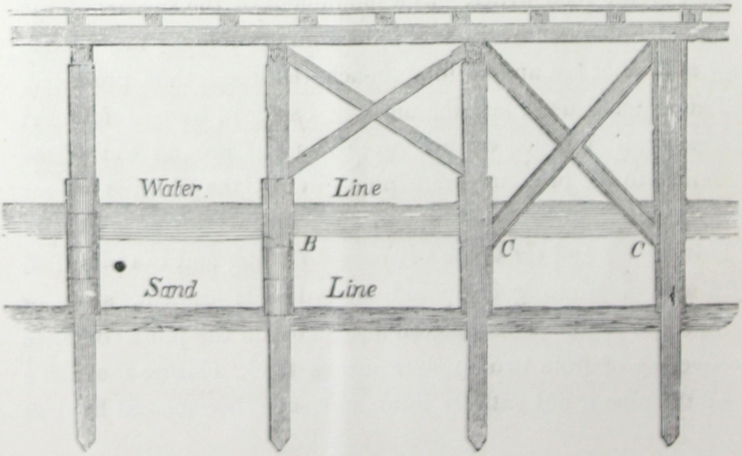


DESCRIPTION OF PATENTEE'S METHOD.

The Patentee of the invention hereinafter described, for preservation of piles and timber, used in water infested by Teredo, was led to its discovery and successful use by observing the rapid destruction of the piles of the railroad bridge connecting the island upon which the City of Galveston, Texas, is built, with the main land; and those of the wharves of that city. This bridge is about two miles long, built in water from two to ten feet deep, was constructed about eight years ago, and cost $100,000 in gold. The piles are of red cedar, and but for the Teredo would last for a century; but so rapidly were they destroyed by it, that it has cost annually about one-third of the original price of construction to keep it in repair. The patentee applied to the piles of this bridge, which were put in to replace those destroyed, his method as described herein, with complete success; indeed, it requires but little knowledge of the habits and structure of the Teredo and of the simple and effective means he uses to protect the piles, to be satisfied that it must be entirely successful. This bridge was nearly destroyed by a terrible storm during the fall of 1867, but the piles thus protected still stand, as the late Superintendent of the road writes, "as a monument of the success of the Patentee's invention." It is indeed impossible for the Teredo or any other sea animal to approach the wood thus protected. The material used, and the mode of using it, were as follows: a casing of vitrified earthen ware was put around the pile—similar to the ordinary drain pipe—in lengths of three or four feet, in cylinders for new and in segments for piles already built upon, and the space between the casing and the pile filled in with a grouting composed of hydraulic cement, shell or lime and sand. This material forms around the pile a complete covering of from two to four inches thick, closing the joints of the pipe if not entirely tight, and soon becomes as hard as the casing, binding it closely to the pile, which is so much strengthened, stiffened and protected thereby that piles of smaller size than heretofore used will be found sufficient. Many other animals, in a less degree than the Teredo, and the abrasion of the water, injure the wood if unprotected, which by means of this invention are completely excluded. Piles of sound timber covered by this method are practically indestructible under water, and with it cheaper wood as well as smaller piles may be effectively used, and the saving thus to be made will, it is believed, pay the cost of the protection. The vitrified casing cannot be injured except by actual violence, the water having no effect upon it. The piles may be covered before or after being driven if the bottom be of sand, as they may be fixed in sand by a method which dispenses with the old fashioned driver, but the inventor found no sort of difficulty, even in rough water, in putting it on after the pile was in its place.

Piles can be covered to any required depth and be made to answer for piers, for bridges, and other purposes. The practical application of the pipe and casing is simple and expeditious. Full particulars will be furnished on application to the Patentee.

The following wood cut shows the piles of a bridge protected by casing:



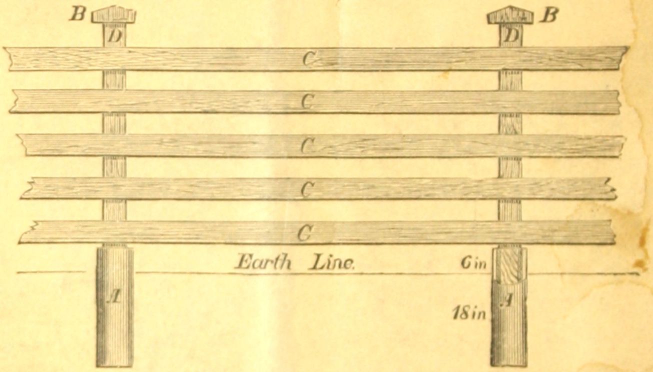
DESCRIPTION OF MATERIAL AND ITS COST.

The manufacture and extended use of earthen, stone ware and cement pipe is comparatively new, but manufactories on an extensive scale, with improved machinery, are rapidly being erected in many parts of the country, and their products may be found in any large market, of any size and quality, and the price will decrease as competition and skill in the manufacture increase with the demand which is daily growing. The Patentee, in his specifications, covers all material which can be used for the casing, and is confident that for large works he can have it made at prices much below those asked now. A pipe of hydraulic cement, if made of proper material and properly manipulated and allowed to indurate sufficiently, will resist the action of sea water; it may be made in any place where there is sand and gravel or shell, and with simple apparatus, by unskilled labor. The cost of this application is, even at present prices, much cheaper than any other mode of completely covering the pile. Compared with copper it costs about one-fourth for vitrified and cement casing; iron will not answer, as it oxidizes quickly in sea water. Impregnating timber has been tried in Europe for a century or more. Sellius says six hundred modes of protection were used before and in his day, most of them of this sort, and entirely failed, for reasons which are patent to any one who will study the Teredo's structure and habits, and which have been already given; and besides, any substance forced into the pores of the wood will soon disappear in water. The Government of the United States, at its navy yards, by its intelligent and experienced officers, for many years tried experiments with all sorts of substances, both for impregnation and coating the surface of timber, and no effective remedy was discovered for its preservation. The reports of these officers and the specimens of timber treated by them and then destroyed by Teredo, are among the archives of the Navy Department at Washington, and show that none of them accomplished the important end of complete protection which is perfectly and cheaply effected by the Patentee's simple and easily applied method.

DESCRIPTION SPECIMENS OF TIMBER.

It may seem unnecessary to say more of the powers of destruction possessed by the Teredo, which are well known to all who have given it any attention; but as the public generally knows but little of them, it may be well to describe two specimens of wood, which show how rapidly and completely it is destroyed. The first is a cube of wood about six inches square, which was placed in the Elizabeth river at Norfolk and remained a year; it is completely honeycombed, though the shape is not changed, and the wood may be crumbled in the hand like paper, and its weight is scarcely more than that of a paper box of the same size. The other is a pile of red cedar ten inches in diameter, which was taken out of the bridge at Galveston after being down but a short time. It has been completely cut off at the water line by Teredo, and the end which was in the water is so filled with holes that it looks like a sponge; the part of the pile which was out of the water is as hard and sound as when cut, and would be good for a hundred years.

Any further information in regard to this invention may be had upon application to the Patentee, No. 35 North Charles Street, Baltimore, Maryland.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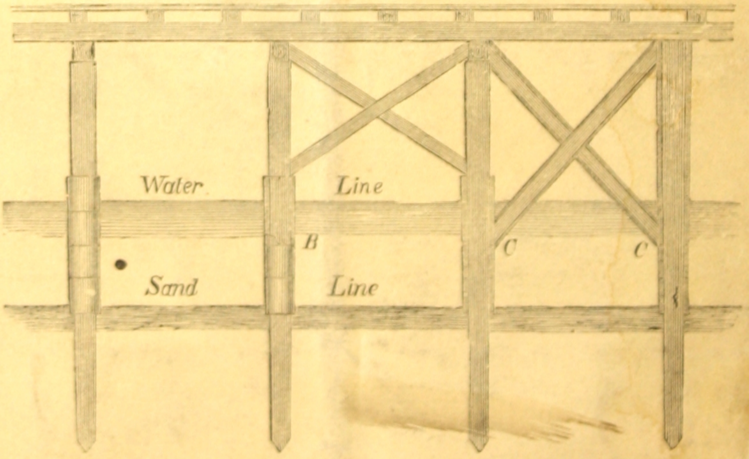
Water Line
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C
C
Sand Line